Policy Brief on "Examining Increased Renewable Energy Production from Landfill Gas in Michigan"

Technological advances touch every part of our lives, often without our knowledge and in places we'd least expect. Landfills may be one of these overlooked occurrences. Landfills are most commonly considered the place where our garbage goes, but increasingly over the past decade they have become sources of renewable energy that can be generated from that waste.

Recycling yard waste can now yield two options: a soil amendment through composting, and a renewable energy source through landfill gas recovery technology.

While energy demands are expected to increase in the future, conventional capacity to meet those needs is uncertain. Consumers and policymakers are looking at renewable energy to fill the gap. Landfill energy is one such alternative. In order to meet growing energy needs, however, landfills will need an influx of organic matter such as grass and leaves, generally called "yard waste," to fuel energy production.

In Michigan, yard clippings have been banned from disposal in municipal solid waste landfills since March 1995. Banning yard waste from landfills was considered a means of promoting composting and recycling. However, given the increased public support for renewable energy and the national objective of reducing dependence on fossil fuels and foreign oil, a review of waste disposal policy and alternatives to the yard waste ban is warranted.

This study set out to examine potential increased renewable energy production from landfill gas in Michigan to determine whether an exemption for landfill energy-producing facilities under the existing yard waste ban would prove fruitful. Despite the complexity of the issue, a number of clear conclusions can be drawn from the research and modeling involved in this study.

Statewide Landfill Energy-Production Capacity

Facility type	Yard waste	MW		Peak	
		2007	2015	Year	MW
Current Major	Excluded	188.8	230.4	2014	232.0
	Included	204.8	265.6	2015	265.6
Current Major plus Potential Major	**Included**	241.6	315.2	2016	316.8

SOURCE: NTH Consultants Ltd. 2007.
NOTE: Current major facilities are landfills with existing landfill energy-production facilities. Potential major facilities are landfills that produce enough landfill gas to generate 1.6 MW or more.

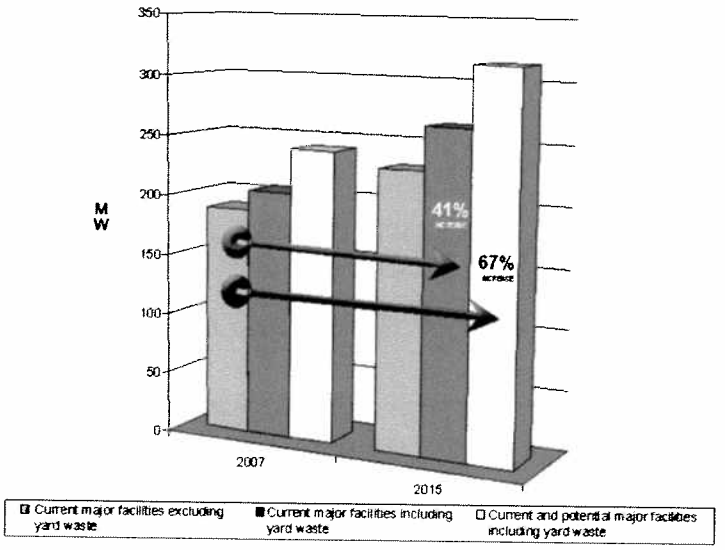
- Since 1985, landfill gas recovery technology has advanced into a viable renewable energy option. Forward-thinking companies have begun to harness methane to produce energy by installing collection piping as each landfill cell (portion of facility) is filled, not after it is filled. This development has demonstrated the vast potential of landfill energy-production facilities and provides the basis for the current discussion.

- Based on existing landfill energy-production facilities and modeling, adding yard waste to landfills can increase the creation of renewable energy. Modeling shows that we can capture even more power than we are currently producing by reintroducing organic yard waste material. In addition to the study results in graphical form, the study also finds:

  - By 2015 and adding yard waste in Michigan landfills that currently operate landfill energy-production facilities, we can increase renewable energy capacity 265.6 MW or 41 percent over current levels. If we further developed all potential landfill energy-production facilities in Michigan, we can increase renewable energy capacity 315.2 MW or 67 percent over current levels!

  - Landfill gas-to-energy projects provide unparalleled reliability and availability as a renewable energy source. As long as there is solid waste, there will be landfill gas that can produce methane fuel. Additionally, landfills can provide a long-term energy source, as they produce gas for 20 to 30 years after closure.

Michigan Landfill Energy Production Capacity, Including and Excluding Yard Waste



SOURCE: NTH Consultants Ltd. 2007.

  - Landfill gas is a sustainable source of renewable energy, derived from landfill biomass that does not significantly limit overall landfill capacity. It is estimated that as a result of the decomposition process, yard waste loses half of its weight and 50 to 75 percent of its volume.

- Attempts to repeal the yard waste ban in other states have met with mixed results for a variety of reasons. Recently, however, policymakers in other states have become more amenable to considering exemptions. It is time to revisit this policy in Michigan to examine whether it is producing beneficial results.

Based on analysis of current landfill energy-production capacity, landfills should be considered a source for reliable, sustainable, renewable energy. However, if landfill energy-production technology is to play a role in helping Michigan meet its future energy needs and improve its economy, we must first boost creation of landfill gas so that more renewable energy can be produced. One way to increase the organic waste stream is to allow yard waste back into landfills. There are, of course, other means to this end, but none as intuitively simple because yard waste has the highest amount of organic content available in the non-landfilled waste stream.

Adding Yard Waste to Landfills Does Not Mean More Greenhouse Gas

Research shows that adding yard waste to energy-producing landfills will create more renewable energy in Michigan. Recent follow-up research finds statewide landfill gas emissions will be reduced if existing and potential landfill gas-to-energy facilities increase their collection efficiency as a condition of accepting yard waste for landfill disposal.

Landfills produce gas, typically consisting of roughly 50 percent methane (the primary component of natural gas) and 50 percent carbon dioxide. A landfill gas power plant captures this gas, which would otherwise be released into the atmosphere or burned off in a flaring process. Methane is a greenhouse gas that has 23 times the negative impact of carbon dioxide. By using landfill gas to produce energy, the U.S. Environmental Protection Agency (USEPA) states that landfills can significantly reduce their emissions of methane and at the same time avoid the need to generate energy from fossil fuels, thus reducing emissions of methane, carbon dioxide, sulfur dioxide, nitrogen oxides, and other pollutants from fossil fuel combustion.

Landfill gas collection systems designed for high efficiency of gas removal are essential to ensure that emissions will not increase as a result of the disposal of additional organic material.

In Michigan, there are 20 operating and 12 potential landfill gas-to-energy facilities. If yard waste were added to these landfills, by 2015, the average amount of renewable energy capacity would increase by 41 percent. The efficiency of the gas collection system at a landfill determines the amount of emissions that escape into the atmosphere. Therefore, ensuring a statewide increase in collection efficiency ***as a condition for allowing the addition of yard waste*** will offset any increase in emissions that may potentially result from the addition of yard waste to the landfill. As Exhibit 1 shows, as the collection efficiency increases, the proportion of gas collected increases and the proportion of gas emitted decreases.

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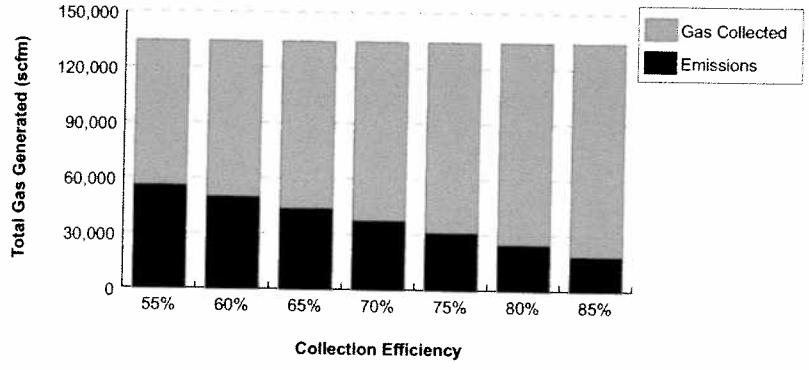
Although there is a general lack of published baseline data regarding current statewide collection efficiency, the USEPA suggests a collection efficiency of 60 percent. At this collection efficiency, a 7.4 percent increase in overall collection efficiency would be necessary to offset landfill gas resulting from the addition of yard waste; in other words an average statewide collection efficiency of 67.4 percent would result in no additional emissions from the disposal of yard waste to Michigan landfills.

Requiring 70% collection efficiency ***before*** allowing gas-to-energy landfills to accept yard waste would adequately protect against the statewide potential emissions resulting from yard waste disposal at landfills.

Exhibit 1

Proportion of Landfill Gas Emitted Statewide at Increasing Collection Efficiency, 2015, with the Addition of Yard Waste



SOURCE: NTH Consultants Ltd. 2007.

Acknowledgements

Sponsored and prepared for Granger
Prepared and submitted by Public Sector Consultants Inc.

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